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ABSTRACT

This four-part report discusses the planning of modules through the use of a matrix and contains two case studies as illustration. Part 1, "Applying the Matrix to an Existing Course Outline," shows how to analyze a course outline, adapt it to a matrix, and plan appropriate modules. Part 2, "Matrix Analysis," examines the matrix in order to discover its potential use for course development. Part 3, "Paragraph Format: Fundamentals of Nursing: (Overview)" presents an example of well-developed course material that can be used as the starting point for a matrix. Part 4, "Matrix Format: Fundamentals of Nursing: (Overview)" shows how material that previously appeared in paragraph format can be translated with minimum effort and time into matrix format. (Author/JS)

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TITLE

PLANNING MODULES THROUGH MATRIX ANALYSIS

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DATE

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TABLE OF CONTENTS

Pages

PLANNING MODULES THROUGH MATRIX ANALYSIS----------1

A APPLYING THE MATRIX TO AN EXISTING COURSE OUTLINE----------2

OBJECTIVES----------3

APPLYING THE MATRIX TO AN EXISTING COURSE OUTLINE----------4

THE EMPTY MATRIX----------5

ANALYZING AN EXISTING COURSE OUTLINE----------6

THE MEASUREMENT OF THE VITAL SIGNS----------7

THE MATRIX X-RAY OF AN EXISTING COURSE OUTLINE----------9

AN ANALYSIS OF THE PRECEDING MATRIX X-RAY----------10

THE MEASUREMENT OF THE VITAL SIGNS----------11

USING THIS MATRIX X-RAY TO IMPROVE YOUR OBJECTIVES AND THE LEARNING OF YOUR STUDENTS----------13

THINGS TO DO AS A RESULT OF THE MATRIX X-RAY----------14

B MATRIX ANALYSIS----------17

THE MATRIX----------18

PARAGRAPH FORMAT: FUNDAMENTALS OF NURSING (OVERVIEW)----------20

MATRIX FORMAT: FUNDAMENTALS OF NURSING (OVERVIEW)----------21

PLANNING MODULES THROUGH MATRIX ANALYSIS

The present document contains two case studies of how to plan a module with the help of a matrix.

A matrix is a planning tool that pinpoints objectives, evaluations, and resources in the three domains of knowledge, performance, and attitudes.

As a diagram, a matrix presents a one-page overview of any proposed module.

This document shows how to take either existing course outlines or existing materials and organize them into a format that is appropriate for a module.

In this approach, a module is composed of four components: OBJECTIVES, PRETESTS, LEARNING ENVIRONMENTS, and POSTTESTS.

The matrix provides complete sections on objectives, evaluations, and resources.

After the matrix analysis into objectives, evaluations, and resources, the instructor is ready to sequence and devide the material into appropriate module format. In the module, the evaluation section of the matrix is subdivided into pretest and posttest components.

After the planning of a module has been completed, there rest many obvious practical difficulties such as the ability to provide for continuous editing, addition, deletion, updating, changes, and technical improvements.

This particular document is limited to the planning necessary to organize existing materials. Other documents are available to go into some of the technical implementation problems of setting up a complete system of modules.

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APPLYING THE MATRIX TO AN EXISTING COURSE OUTLINE

The format of this document is very simple.

STEP 1

A nursing instructor at the level of CEGEP developed a unit of material on the measurement of the vital signs.

STEP 2

This unit of material was summarized in two pages.

STEP 3

This unit of material was subjected to a matrix x-ray.

STEP 4

The original two pages submitted by the teacher were submitted to a codification process in order to determine the strengths and weaknesses of the material at hand.

STEP 5

A number of suggestions were made to the teacher as to improve course development by use of the matrix.

Teachers who are thoroughly familar with the matrix will be able to start translating their current course outline into the matrix format as a result of reading this publication.

Once a course outline is in matrix format, it is a very simple task to develop a module based upon this new perspective.

Teachers who feel the need for more help in this process are encouraged to attend one week module development seminars in which this process is explained slowly, step-by-step, and in an analytical fashion.

For more details about these workshops, consult with Mr. McDonald, the DSP of the CEGEP of Hull.

For examples of the modules that have developed as a result of these seminars, write directly to FILMS.

OBJECTIVES

KO: You look at a general idea of how the matrix can be applied to a module written by you.

PO: You try out some of these suggestions therein recommended.

AO: You decide whether or not the matrix can be applied successfully to better your modules.

APPLYING THE MATRIX TO AN EXISTING COURSE OUTLINE

The following page entitled, THE EMPTY MATRIX, can be understood and applied in many different ways. The objective of this short presentation is to show you how the empty matrix can be applied to x-ray and improve your existing course outline.

For many people, the empty matrix can be summed up in nine knowledge objectives. These nine knowledge objectives are on the memory recognition level. They state:

KO stands for knowledge objective

KE stands for knowledge evaluation

KR stands for knowledge resource

PO stands for performance objective

PE stands for performance evaluation

PR stands for performance resource

AO stands for attitude objective

AE stands for attitude evaluation

AR stands for attitude resource

This type of memory and comprehension objective is correct. The following pages are intended to show you how to go on to other performance objectives that can be attained with the help of the empty matrix.

THE EMPTY MATRIX

ANALYZING AN EXISTING COURSE OUTLINE

Look at the following two pages. They give a typical module in the field of health education. The title of this module is MEASUREMENT OF THE VITAL SIGNS. From the way this module is presented (e.g., major concepts and subconcepts), it is obvious that the teacher is fully aware of the knowledge objectives of the module. Let's go even farther.

1. Read through these pages
2. Underline all verbs
3. Ask yourself whether these verbs refer to knowledge, performance, or attitude.
4. Mark all the verbs that refer to knowledge with a K.
5. Mark all the verbs that refer to performance with a P.
6. Mark all the verbs that refer to attitude with an A.
7. Look carefully at sections C and F. Ask yourself if some of the items described as behavioral objectives could not more properly be described as evaluation items.
8. Look at section E on instructional alternatives. Ask yourself whether or not these alternatives are clearly linked with specific behavioral objectives.

All the above eight steps are getting you ready for a matrix x-ray of this module on MEASUREMENT OF THE VITAL SIGNS.

A - Major Concept: The Measurement of The Vital Signs

B - Sub-Concepts:

1. Heat distribution in the body
2. The circulatory system and pulse
3. Exchange of oxygen and carbon dioxide

C - Behavioral Objectives:

1. Describe the process of heat production distribution and control in the body.
2. List two ways to encourage the loss of heat from the body.
3. Describe what happens within the circulatory system to cause a pulse.
4. Differentiate between internal and external respiration.
5. Given a patient's chart, locate and write the recorded temperature, pulse, and respiration.
6. Differentiate between the following terms which are used to describe body temperature: hyperpyrexia, pyrexis, febrile, afebrile, continuous, intermittent, remittent, relapsing, crisis, lysis, hypothermia.
7. Demonstrate obtaining a patient's oral, axillary, and rectal temperature using the appropriate thermometer and record the reading within a plus or minus 0.2 degree of the instructors reading.
8. Given an anatomical drawing of a person, locate five sites where pulse evaluation can be made.
9. Differentiate between the following terms which are used to describe the pulse: arrythmia, tachycardia, bradycardia, dicrotic, bounding, thready, imperceptible, apical-radial and pulse defecit.
10. Demonstrate counting a pulse and recording a rate within 2 points of the rate obtained by the instructor.
11. Differentiate between the following terms which are used to describe respirations eupnea, orthopnea, dyspnea, apnea, Cheyne-Stokes, stertor, shallow, deep, tachypnea, bradypnea.
12. Demonstrate counting respirations and record a rate within two points of the rate obtained by the instructor.
13. Describe the relationship between the temperature, pulse and respiration.
14. List normal temperatures, pulse rates and respiratory rates for the following ages: infants, two-year old, ten-year old, twenty-year old, fifty-year old, and seventy-year old.

D - Pre-test

E - Instructional Alternatives (Ways of Learning)

1. Audio-visual aides - students' choice

   a. slides
   b. film loops
   c. filmstrips
   d. transparencies
   e. "hand-outs"

2. Programmed texts - students choice

   a. Swansburg "Measurement of the Vital Signs"
   b. McInnes "The Vital Signs"

3. Textbook Readings - students' choice

   a. Rubino. "Fundamentals of Nursing" pgs. 98-102
   b. Gregg and Rees. "Scientific Principles in Nursing" pgs. 194-231
   c. Fuerst and Wolff. "Fundamentals of Nursing" pgs. 69-87.
   d. Kozier and DuGas. "Basic Patient Care" pgs. 86-104.

4. Independent college laboratory practice.

5. Lecture-attendance optional

6. Supervised college laboratory practice.

7. Supervised clinical laboratory practice: minimum 2 hours.

8. Resource person (instructor) to help student as needed.

9. Self-test

F. Measurement for assessment of achievement.

1. Objective written test.

2. Skill measured in terms of critical requirements.

   a. College laboratory performance
   b. Clinical laboratory performance

THE MATRIX X-RAY OF AN EXISTING COURSE OUTLINE

KO	PO	AO
KO-1 KO-2 KO-3		
KE	**PE**	**AE**
KE-1a b c KE-2a b c d KE-3a KE-1-2-3a b	PE-1-2-3a b PE-1a PE-2a PE-3a	
KR	**PR**	**AR**
KR-?	PR-?	AR-??

AN ANALYSIS OF THE PRECEDING MATRIX X-RAY

The following two pages reproduce the course outline filled in with such symbols as KO-1, KO-2, KO-3, and KE-1a.

These symbols are an attempt to help you x-ray your existing course outline.

THE MATRIX X-RAY OF AN EXISTING OUTLINE provides a clear-cut summary of what has been analyzed for your existing course.

Look at the following two pages of the course analysis.

1. Make sure you understand what each symbol stands for
2. Make sure you understand the meaning of such things as KR-?
3. KR-? doesn't mean that you have made no provision for a knowledge resource. It simply points out that the exact page or paragraph you have in mind to be used as a knowledge resource is not specifically linked to a particular knowledge objective. In other words, you have applied the shotgun approach to resources.
4. KE-? doesn't imply that you have not worked out a number of test questions, It merely shows you that each test question you have indicated is not specifically referred to a precise objective.

With these ideas in mind, go on to THE MATRIX X-RAY OF AN EXISTING COURSE OUTLINE. This will show you whether your course is completely balanced or lopsided.

A - Major Concept: The Measurement of The Vital Signs

B - Sub-Concepts:

KO-1 1. Heat distribution in the body

KO-2 2. The circulatory system and pulse

KO-3 3. Exchange of oxygen and carbon dioxide

C - Behavioral Objectives:

KE-1a 1. Describe the process of heat production, distribution and control in the body.

KE-1b 2. List two ways to encourage the loss of heat from the body.

KE-2a 3. Describe what happens within the circulatory system to cause a pulse.

KE-2b 4. Differentiate between internal and external respiration.

PE-1-2-3a 5. Given a patient's chart, locate and write the recorded temperature, pulse, and respiration.

KE-1c 6. Differentiate between the following terms which are used to describe body temperature: hyperpyrexia, pyrexia, febrile, afebrile, continuous, intermittent, remittent, relapsing, crisis, lysis, hypothermia.

PE-1a 7. Demonstrate obtaining a patient's oral, axillary, and rectal temperature using the appropriate thermometer and record the reading within a plus or minus 0.2 degree of the instructors reading.

KE-2c 8. Given an anatomical drawing of a person, locate five sites where pulse evaluation can be made.

KE-2B 9. Differentiate between the following terms which are used to describe the pulse: arrythmia, tachycardia, bradycardia, dicrotic, bounding, thready, imperceptible, apical-radial and pulse defecit.

PE-2a 10. Demonstrate counting a pulse and recording a rate within 2 points of the rate obtained by the instructor.

KE 3a 11. Differentiate between the following terms which are used to describe respirations: eupnea, orthopnea, dyspnea, apnea, Cheyne-Stokes, stertor, shallow, deep, tachypnea, bradypnea.

PE 3a 12. Demonstrate counting respirations and record a rate within two points of the rate obtained by the instructor.

KE-2-3a 13. Describe the relationship between the temperature, pulse and respiration.

KE-1-3b 14. List normal temperatures, pulse rates and respiratory rates for the following ages: infants, two-year old, ten-year old, twenty-year old, fifty-year old, and seventy-year old.

D - Pre-test (KE! PE? AE ??)

E - Instructional Alternatives (Ways of Learning)

1. Audio-visual aides - students' choice (AR-??)

KR-? PR-? AR-?
- a. slides
- b. film loops
- c. filmstrips
- d. transparencies
- e. "hand-outs"

2. Programmed texts - students choice

KR-? PR-?
- a. Swansburg "Measurement of the Vital Signs"
- b. McInnes "The Vital Signs"

*specific pages could be cited to remove "?"

3. Textbook Readings - students' choice

KR-? PR-? AR-?
- a. Rubino. "Fundamentals of Nursing" pgs. 98-102
- b. Gregg and Rees. "Scientific Principles in Nursing" pgs. 194-231 (KR-?)
- c. Fuerst and Wolff. "Fundamentals of Nursing" pgs. 69-87. (PR-?)
- d. Kozier and DuGas. "Basic Patient Care" pgs. 86-104. (AR-?)

PR-? 4. Independent college laboratory practice.

KR-? 5. Lecture-attendance optional

PR-? 6. Supervised college laboratory practice.

AR-?; PR-? 7. Supervised clinical laboratory practice: minimum 2 hours.

AR-? PR-? 8. Resource person (instructor) to help student as needed.

9. Self-test (AR-?)

F. Measurement for assessment of achievement.

1. Objective written test. (KE-?, PR-?)

2. Skill measured in terms of critical requirements. (AR?)

   a. College laboratory performance PR-?
   b. Clinical laboratory performance AR-?

USING THIS MATRIX X-RAY TO IMPROVE YOUR OBJECTIVES AND THE LEARNING OF YOUR STUDENTS

When you get right down to it, this use of the matrix x-ray may have some bookkeeping utility for you. It certainly does not suggest that you basically alter your course or what you are doing.

From the viewpoint of your students, this matrix x-ray pulls things together. It allows you to see if you have balanced knowledge objectives, performance objectives, and attitude objectives. It allows your students to x-ray the exams they are given to find out whether they are being over-evaluated on the knowledge domain rather than being evaluated for their achievement and success in the attitude and performance domains.

THINGS TO DO

AS A RESULT OF THE MATRIX X-RAY

In order to fully understand the following list of things to do, it is presumed that you the reader have gone through document PO2, entitled, HOW TO INDIVIDUALIZE YOUR CLASSROOM INSTRUCTION BY USING PERFORMANCE OBJECTIVES. This list of suggested activities is nothing more than a collection of recommendations. It is for you the professional teacher to decide whether or not they are worth adopting.

1. It is obvious that the strongest part of your matrix is the KE or knowledge evaluation segment. It it the goal of this analysis to make every part of your matrix equally as strong. There are many ways to go about doing this.
2. You could take each test item you have in the knowledge evaluation section and develop a corresponding PE or performance evaluation test item.
3. After this, it would be a simple matter to come up with a self-correctional AE or attitude evaluation component which each student would use to keep track of her progress.
4. Either before or after all of this is done, it would be valuable to go through the KE section and decide whether or not the existing statements of KO-1, KO-2, and KO-3 are the main outcomes.

5. If KO-1, KO-2, and KO-3 do not need revision, it would be a simple matter to go on and develop PO-1, PO-2, and PO-3 correlated with these three knowledge objectives.
6. As the next step it would be quite logical to develop to AO-1, AO-2, and AO-3 correlated with both the three knowledge objectives and the three performance objectives.
7. On the other hand, if you feel that KO-1 must be broken down into KO-1.1, KO-1.2, and KO-1.3 and so forth, it would be a good idea to consider making KO-1 and all its subdivisions a separate mini-module.
8. The development of this separate mini-module should be conceived on the level of objectives rather than test items. After you have looked at everything you want the student to do in the PO domain, it would be good to go back to the KO domain and finally to the AO domain. This will keep your course from getting top heavy in knowledge.
9. Once you have developed the objectives and test items in this way, you will find yourself using resources both more specifically and more powerfully. Thus, instead of telling a student to buy a specific book, you may be finding yourself telling a student to go to a specific page in a specific book for a specific objective. This is more economical in terms of time and money. It makes more sense in concentrating the education you give your students.

10. A lot of people worry about how they tie their modules together to form higher level skills. The above analysis has not concentrated on chaining lower level skills into higher level skills. This is still possible but this will go into other considerations that change the emphasis from the matrix x-ray of an existing course outline to THE CHAINING OF LEVELS WITHIN THE INDIVIDUAL COMPONENTS OF A MATRIX.

MATRIX ANALYSIS

This document is intended to help the reader do three things:

A. Analyze the matrix for possible use in course development.

B. Organize existing material in such a way as to make improvements via the matrix.

C. Balance existing course programs through an application of matrix analysis.

The section entitled, THE MATRIX is intended to help the reader analyze the matrix in order to discover potential uses for course development.

The section entitled, PARAGRAPH FORMAT: FUNDAMENTALS OF NURSING: (OVERVIEW) is intended to present a typical example of well developed course material that can be used as the starting point for a matrix.

The section entitled, MATRIX FORMAT: FUNDAMENTALS OF NURSING: (OVERVIEW) is intended to show how material that previously appeared in paragraph format can be translated with minimum effort and time into matrix format.

Readers who are interested in this process and desire further information may contact:

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For those interested in immediate information, a telephone call may be made to Area Code 518: 474-6386.

THE MATRIX

The matrix is a one page tool that enables educators to analyze, organize, and balance existing courses and learning opportunities.

ANALYZE refers to pinpointing existing components, parts, and ingredients.

ORGANIZE refers to arranging systematically the product of the above analysis.

BALANCE refers to identifying any high priority components that need either improvement or implementation.

One of the fastest ways to analyze, organize, and balance is to ask the following three questions:

THE O QUESTION (OBJECTIVE QUESTION):

What is the most important priority or objective for this activity?

THE E QUESTION (EVALUATION QUESTION):

What evaluation instruments or yardsticks are available to measure success of this high priority objective?

THE R QUESTION (RESOURCE QUESTION):

What are the various alternatives that are available to achieve the high priority objective?

Each of the above three questions can be answered either in the K-domain, P-domain, or A-domain.

The K-domain refers to knowledge, data, information, principles, concepts, generalizations, and other cognitive materials.

The P-domain refers to performance, things, training, techniques, basic skills, procedures, and other psychomotor components.

The A-domain refers to attitude, people, motivation, human relations, values, appreciations, and other affective ingredients.

PARAGRAPH FORMAT: Fundamentals of Nursing
(OVERVIEW)

OVERVIEW OF COURSE

Through lecture-discussion, demonstration, and individually designed and supervised clinical laboratory practice, the student is guided in the development of those knowledges and habits of evaluation, judgement, and technical skill desirable for future professional ability. The student is guided in the analysis of basic nursing needs, and problem solving.

Considerable attention is given to the integration and application of knowledge and thought derived from the biologic and physical sciences.

STATEMENT OF PURPOSE

To help the student master the principles of the physical and biological sciences, and to apply these principles to basic nursing care.

OBJECTIVES

1. To promote the student's understanding of professionalism.
2. To know the evolution and trends of professional nursing.
3. To develop an understanding of wellness.
4. To develop an understanding of social, cultural, psychological, economic, and educational factors upon behavior.
5. To recognize each person as an individual with his own unique problems and needs.
6. To acquire knowledges into those factors that contribute to states of wellness.

MATRIX FORMAT: Fundamentals of Nursing
(OVERVIEW)

KO Master scientific principles in order to problem solve • observe • communicate • work on a health team • maintain health	**PO** Provide basic nursing care • casefinding • health counseling • health teaching • bedside care	**AO** Develop habits of: • assessment • judgment and planning • care • evaluation Recognize each person as an unique individual
KE Pinpoint those factors that contribute to wellness Succeed on: • comprehensive exams • unit exams • written and oral projects • demonstrations • conference evaluations	**PE** Respond to individual needs and problems in: • supervised clinical laboratory • realistic simulations	**AE** Specify and react to factors influencing behavior: • social • cultural • psychological • economic • educational
KR Participate in: • lecture-discussion • demonstration • conference • visual aids • student-presented reports • classroom	**PR** Function in: • supervised clinical laboratory practice • realistic simulations	**AR** Analyze evolution and trends of professional nursing with: • peers • guest speakers • staff